the beads.

C L A I M S

1. A method of manufacturing a carcass structure for vehicle tyres, comprising the steps of:
- making at least one carcass ply (3a, 3b) by deposition of elongated sections (13, 14, 15, 16) circumferentially distributed on a toroidal support (11), each of said elongated sections (13, 14, 15, 16) extending in a U-shaped configuration around the cross-section outline of the toroidal support (11), to define two side portions (13a, 14a, 15a, 16a) mutually spaced apart in an axial direction, and one crown portion (13b, 14b, 15b, 16b) extending at a radially outer position between the side portions (13a, 14a, 15a, 16a);
- applying annular reinforcing structures (4) to a region close to the inner circumferential edges of said at least one carcass ply (3a, 3b);
characterized in that each of said sections (13, 14, 15, 16) is laid down substantially in a plane (N, N') which is parallelly offset relative to a meridian plane (P) of the toroidal support (11).

2. A method as claimed in claim 1, wherein each of said sections (13, 14, 15, 16) is laid down in a plane (N, N') parallel to said meridian plane (P), so that each crown portion (13b, 14b, 15b, 16b) substantially lies in a reference plane (R, R') radial to said geometric axis (O) of the toroidal support (11) and passing through a transition point between the crown portion (13b, 14b, 15b, 16b) and the respective side portions (13a, 14a, 15a, 16a), whereas said side portions (13a, 14a, 15a, 16a) extend each in an inclined direction relative to said reference plane (R, R').

3. A method as claimed in claim 1, wherein deposition of the elongated sections (13, 14, 15, 16) takes place by the following steps:

- laying down a first series of sections (13) circumferentially distributed on said toroidal support (11);
- laying down a second series of sections (14) circumferentially distributed on said toroidal support (11).

4. A method as claimed in claim 3, wherein sections (13, 14) belonging respectively to the first and second series are laid down in offset deposition planes (N, N') at respectively opposite sides relative to said meridian plane (P), so that the side portions (13a, 14a) of the sections (13, 14) respectively belonging to the first and second series have respectively crossed orientations.

5. A method as claimed in claim 3, wherein the sections (13) of the first series are laid down at a circumferential pitch which is at least twice the width of each section, the sections (14) of the second series being laid down in the spaces existing between the sections (13) belonging to the first series so as to define said at least one carcass ply (3a) together with the last mentioned sections.

6. A method as claimed in claim 3, wherein said elongated sections (13, 14, 15, 16) are laid down at a circumferential pitch corresponding to a multiple of their width, each of said sections (13, 14, 15, 16) being of a strip-like structure and comprising longitudinal and parallel thread-like elements (17) at least partly covered with at least one layer of raw elastomer material (20).

7. A method as claimed in claim 1, wherein the crown portions (13b, 14b, 15b, 16b) of each section are arranged consecutively in side by side relationship along the circumferential extension of the toroidal support (11), whereas the side portions (13a, 14a, 15a, 16a) of each section are each partly covered with a side portion of at least one circumferentially adjacent section.

8. A method as claimed in claim 3, wherein at least one first primary portion (4a) of each annular reinforcing structure (4) is applied against the side portions (13a, 14a, 15a, 16a) of the sections (13) belonging to the first series, before deposition of the sections (14) belonging to the second series, the latter being laid down with their respective side portions (14a) overlapping the first primary portions on axially opposite sides relative to the side portions (13a) of the sections (13) of the first series.

9. A method as claimed in claim 8, wherein after deposition of the sections (14) belonging to the second series the following further steps are carried out:
- laying down a third series of said sections (15) circumferentially distributed on the toroidal support (11);
- applying second primary portions (4b) of said annular reinforcing structures (4) against the side portions (15a) of said sections (15) belonging to the third series, at axially opposite positions relative to the first primary portions (4a);
- laying down a fourth series of said sections (16) circumferentially distributed on the toroidal support (11), the respective side portions (15a) thereof overlapping the second primary portions (4b) on axially opposite sides relative to the side portions (15a) of the sections (15) of the third series.

10. A method as claimed in claim 9, wherein:
- sections (13, 15) belonging to the first and third series are laid down at a circumferential pitch corresponding to a multiple of the width of the sections themselves, and wherein:
- sections (14, 16) belonging to the second and fourth series respectively are each laid down between two consecutive sections (13, 15) belonging to the first and third series respectively, so that the sections (13, 14) of the first and second series define a first carcass ply (3a) and the sections (15, 16) of the third and fourth series define a second carcass ply (3b) superposed on the first carcass ply (3a).

11. A method as claimed in claim 9, wherein sections (13, 14) belonging to the first and second series are laid down in a first deposition plane (N), and sections (15, 16) belonging to the third and fourth series are laid down in a second deposition plane (N'), said first and second deposition planes (N, N') being offset on respectively opposite sides with reference to said meridian plane (P), so that the side portions (13a, 14a) of the sections (13, 14) belonging to the first and second series have a crossed orientation relative to the side portions (15a, 16a) of the sections (15, 16) belonging to the third and fourth series.

12. A method as claimed in claim 3, further comprising the step of applying additional portions (26) of the annular reinforcing structures (4) to regions close to the circumferential inner edges of said at least one carcass ply (3a, 3b), so that said at least one carcass ply is partly interposed between the second primary portion (4b) and the additional portion (26) of the respective annular reinforcing structure (4).

13. A method as claimed in claim 1, wherein accomplishment of at least one primary portion (4a, 4b) of each annular reinforcing structure (4) comprises the steps of:

- laying down at least one elongated element in concentric coils (21a, 24b) so as to form a circumferentially inextensible annular insert (21, 24) substantially in the form of a crown;
- forming at least one filling body (22, 25) of elastomer material;
- joining the filling body (22, 25) to the circumferentially inextensible annular insert (21, 24).

14. A method as claimed in claim 12, wherein said elongated element is laid down directly against the side portions (13a, 14a, 15a) of the sections (13, 14, 15) previously deposited on the toroidal support (11), so as to form said annular insert (21, 24) directly in contact with said sections (13, 14, 15, 16), said filling body (22, 25) being formed by laying down a continuous strip of elastomer material directly against the previously formed annular insert (21, 24).

15. A carcass structure for vehicle tyres comprising:

- at least one carcass ply (3a, 3b) comprising elongated sections (13, 14, 15, 16) circumferentially distributed around a geometric rotation axis (O), each of said elongated sections (13, 14, 15, 16) extending in a U-shaped configuration around the cross-section outline of the carcass structure, to define two side portions (13a, 14a, 15a, 16a) mutually spaced apart in an axial direction, and one crown portion (13b, 14b, 15b, 16b) extending at a radially outer position between the side portions (13a, 14a, 15a, 16a);
- at least two annular reinforcing structures (4) located close to respective inner circumferential edges of said

at least one carcass ply,
characterized in that each of said sections (13, 14, 15, 16) substantially lies in a plane (N, N') parallelly offset relative to a meridian plane (P) of the carcass structure, so that its crown portion (13b, 14b, 15b, 16b) is oriented, relative to a radial reference plane (R, R') passing through a transition point between the crown portion and at least one of the corresponding side portions (13a, 14a, 15a, 16a), at an angle of different value from the inclination of said at least one side portion (13a, 14a, 15a, 16a).

16. A carcass structure as claimed in claim 15, wherein each of said sections (13, 14, 15, 16) lies in a plane parallel to said radial reference plane (R, R'), so that said crown portion (13b, 14b, 15b, 16b) substantially lies in said radial reference plane (R, R'), whereas each side portion (13a, 14a, 15a, 16a) of the section itself extends in an inclined direction relative to the radial reference plane itself.

17. A carcass structure as claimed in claim 15, wherein each of said sections (13, 14, 15, 16) has a strip-like structure and comprises longitudinal thread-like elements (17) at least partly incorporated into at least one layer of elastomer material (20).

18. A carcass structure as claimed in claim 15, comprising at least one first series and one second series of sections (13, 14),
in which sections (13, 14) belonging to the first and second series respectively lie in offset planes (N, N') on respectively opposite sides relative to said meridian plane (P), so that the side portions (13a) of the sections (13) of the first series have a crossed orientation relative to the side portions (14a) of the

sections (14) of the second series.

19. A carcass structure as claimed in claim 15, comprising at least one first series and one second series of sections (13, 14), wherein sections (13) belonging to the first series are circumferentially distributed at a pitch at least equal to twice the width of said sections, the sections (14) of the second series being disposed in the spaces existing between the sections (13) of the first series so as to define said at least one carcass ply (3a) together with the last mentioned sections.

20. A carcass structure as claimed in claim 19, wherein each of said annular reinforcing structures (4) comprises at least one first primary portion (4a) axially interposed between the side portions (13a, 14a) of the sections (13, 14) belonging to the first series and second series respectively.

21. A carcass structure as claimed in claim 19, further comprising at least one third series of sections (15) circumferentially distributed at a pitch at least equal to twice the width of the sections themselves, and a fourth series of sections (16) disposed in the spaces existing between the sections (15) of the third series so as to define, together with the latter, at least one second carcass ply (3b) superposed on the first carcass ply (3a) formed of the sections (13, 14) of the first and second series.

22. A carcass structure as claimed in claim 21, wherein sections (13, 14), (15, 16) belonging to the first and second carcass plies (3a, 3b) respectively lie in offset planes (N, N') on respectively opposite sides relative to said meridian plane (P), so that the side portions (13a,

14a) of the sections belonging to the first carcass ply (3a) have a crossed orientation relative to the side portions (15a, 16a) of the sections (15, 16) belonging to the second carcass ply (3b).

23. A carcass structure as claimed in claim 21, wherein each of said annular reinforcing structures (4) comprises:
- at least one first primary portion (4a) axially interposed between the side portions (13a, 14a) of the sections (13, 14) belonging to the first series and second series respectively;
- at least one second primary portion (4b) axially interposed between the side portions (15a, 16a) of the sections (15, 16) belonging to the third and fourth series respectively.

24. A carcass structure as claimed in claim 23, wherein each of said annular reinforcing structures (4) further comprises at least one additional portion (26) disposed against the side portions (16a) of the sections (16) belonging to the fourth series, on the opposite side relative to the second primary portion (4b) of the annular structure itself.

25. A carcass structure as claimed in claim 15, wherein the side portions (13a, 15a) of each section (13, 15) belonging to the first and third series respectively are each partly overlapped by a side portion (14a, 16a) of at least one adjacent section (14, 16) belonging to the second and fourth series respectively, at a stretch included between a radially outer edge of the respective primary portion (4a, 4b) of the annular reinforcing structure (4) and a transition region between said side portions (13a, 14a, 15a, 16a) and said crown portions (13b, 14b, 15b, 16b).

26. A carcass structure as claimed in claim 23, wherein each of said first and second primary portions (4a, 4b) of each of said annular reinforcing structures (4) comprises:
- an anchoring annular insert (21, 24) substantially in the form of a crown disposed coaxially with the carcass structure and adjacent to an inner circumferential edge of the carcass plies (3a, 3b), said annular insert being formed of at least one elongated element extending in concentric coils;
- a filling body (22, 25) of elastomer material having one side joined to the annular anchoring insert (21, 24).

27. A carcass structure as claimed in claim 24, wherein said additional portion comprises an additional annular insert (26) substantially in the form of a crown, made up of at least one elongated element extending in concentric coils (26a) and disposed coaxially with the carcass structure at a position disposed axially in side by side relationship with the filling body (25) of the second primary portion (4b) of the respective inextensible annular structure (4).

28. A tyre for vehicle wheels comprising a carcass structure manufactured in accordance with one or more of the preceding claims.

29. A tyre for vehicle wheels, comprising:
- a carcass structure (2) having at least one carcass ply (3a, 3b) comprising elongated sections (13, 14, 15, 16) circumferentially distributed around a geometric rotation axis (O), each of said elongated sections (13, 14, 15, 16) extending in a U-shaped configuration around the cross-section outline of the carcass structure, to define two side portions (13a, 14a, 15a, 16a) mutually spaced apart in an axial direction, and one crown portion (13b,

14b, 15b, 16b) extending at a radially outer position between the side portions (13a, 14a, 15a, 16a), said carcass structure further comprising at least two annular reinforcing structures (4) placed close to respective inner circumferential edges of said at least one carcass ply (3a, 3b);

- a belt structure (5) applied to the carcass structure (2) at a circumferentially outer position thereof;
- a tread band (8) applied to the belt structure (5) at a circumferentially outer position thereof;
- at least one pair of sidewalls (9) applied to the carcass structure (2) at laterally opposite positions;

characterized in that each section (13, 14, 15, 16) of the carcass structure (2) substantially lies in a plane (N, N') parallelly offset relative to a meridian plane (P) of the carcass structure, so that its crown portion (13b, 14b, 15b, 16b) is oriented, with respect to a radial reference plane (R, R') passing through a transition point between the crown portion itself and at least one of the corresponding side portions (13a, 14a, 15a, 16a), at an angle of a different value from the inclination exhibited by said at least one side portion (13a, 14a, 15a, 16a).